

OSC Updates

- Discrepancy in ξ resolved
- Error in field calculations

Discrepancy in ξ

Two approaches to modeling OSC:

- 1) Each turn, each slice of the beam has its average corrected $\langle x \rangle \rightarrow (1-f)\langle x \rangle$
- 2) Each turn, position of each particle is corrected $x_i \rightarrow (1-f)x_i + \text{noise proportional to } \sqrt{N}$

Discrepancy in ξ (cont.)

- In first picture, we want $f \approx 1$ to correct each slice each turn – then, damping time is particles/slice times revolution time – leads to $\xi \sim 10^{-5}$
- In second picture, pick f to balance cooling and heating – leads to $\xi \sim 10^{-10}$ – obtain damping time similar to above, and noticeable shift from regular damping time

Discrepancy in ξ (cont.)

- In first picture, we correct all particles by the same amount, so $x_i \rightarrow X_i - f\langle X \rangle = (1-f/N)x_i + \text{noise}$ proportional to $1/\sqrt{N}$
- This models the kick seen by one particle as being reduced by the presence of other particles
 - even the total kick goes down with more particles – not what our device will do in reality

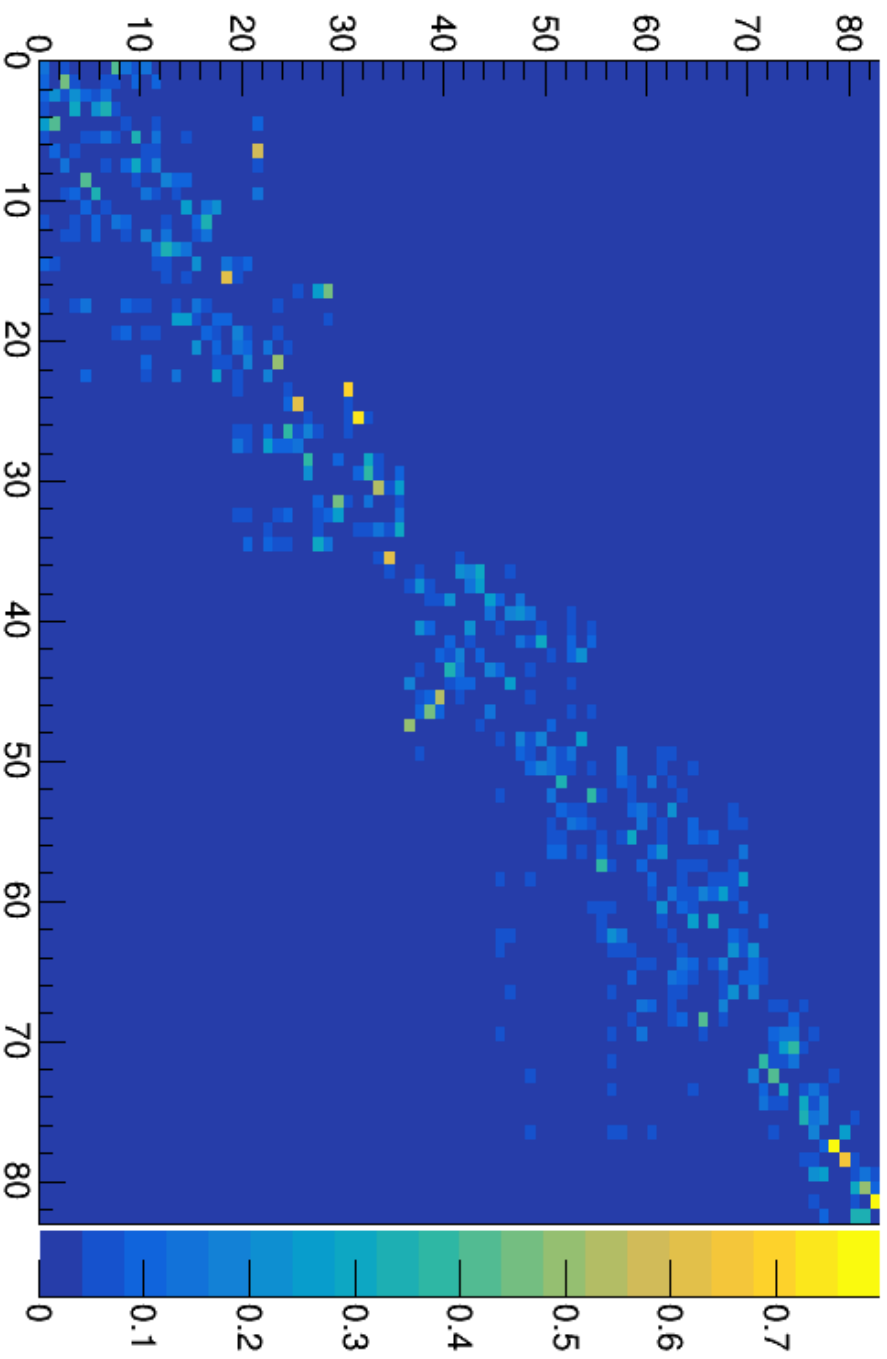
Error in Field Calculations

- Derived field of $(e K k_u v^3)/(\pi \epsilon_0 R [1+K^2/2])$
- Really should be $(e K k_u v^3)/(\pi \epsilon_0 R [1+K^2/2]^2)$
- Confirmed by simulating Leonard-Wiechart fields myself
- Energy transfer should now be 49 meV

Sloppy Models Updates

- Working to reconcile expected lattice distributions with simulated ones
- Converting emittance-minimization for use on PISA genetic algorithms

Comparison of Simulated and Expected Distributions



Squares of dot products of i^{th} singular vector in simulated distribution (horizontal) and j^{th} singular vector in expected one (vertical)

Speed of Light Updates

- Observed timing shifts

Timing Shifts

- Compare tbt files from two consecutive nights – separately timed in
- Shifts in timings are up to 3 units = 30 ps – also, the four buttons move together
- Will see what effect this has on orbit reconstruction